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THE TYPE AND IDENTITY OF DRYOPTERIS CLINTONIANA (D. C. EATON) DOWELL*

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The problem as to the type and identity of *Dryopteris Clintoniana* (D. C. Eaton) Dowell is concerned with two questions: first, as to the material on which the original material was based; second, the identity of this material.

In a recent paper attention was called to the fact that some doubt exists regarding both these questions. As noted at that time, the material in the Yale herbarium identified by Eaton as his *Aspidium cristatum* var. *Clintonianum*, comprises two specimens of *Dryopteris cristata* × *marginalis* as well as several sheets of what is now known as *D. Clintoniana*, but does not include anything collected by Judge G. W. Clinton, in whose honor the fern was named, and whose collection was cited in the original description.

Through information contained in a letter from Mr. G. E. Davenport to Miss Margaret Slosson, it was learned that the original "Clinton" fern had been deposited in the Museum of Natural Science at Springfield, Mass. Thanks to the courtesy of the Springfield Botanical Society, in whose care the specimen was placed, an opportunity was given to examine it, together with a letter of Judge Clinton's concerning it. The letter—said by Mr. Davenport to have been written to John Lewis Russell—reads as follows: "This *Aspidium* troubled me. I could not reconcile it with *A. Goldianum* and it seemed a wide departure from *A. cristatum*. So I sent it to Eaton. Prof. E. answered that he had received it from divers botanists who labelled it *A. Goldianum*, but that he regarded it as a form of *A. cristatum*.

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At my instance, he named it *crisatum* v. *major* — this accounts for label (in pencil) *a* — the filling up is his. He afterwards to my surprise and gratification, named the form for me in the Manual, and so I also furnish the label marked *b*. — G. W. C.

See sheet no. 2 for label *b*."

Sheet no. 1 with label "a" and the letter just quoted is shown in Figure 1. Sheet no. 2 is doubtfully the same as the other, and as Professor Eaton did not see it, need not concern us in the present inquiry. Both sheets — according to Mr. Davenport's letter — were left by Mr. Russell to Mrs. M. L. Owen, who afterwards deposited them with the Springfield society.

At the time the description was first published — 1867 — Prof. Eaton had for comparison (presumably), in addition to Judge Clinton's specimen, the following sheets, which with three later collections are to be seen in his herbarium to-day in the var. *Clintonianum* cover :

- (without name) "Serpentine quarry, New Haven, Connecticut. 1855. Oct. E. [= *Dryopteris cristata* × *marginalis*]."
- "*Aspidium cristatum*, Swz. var. *Clintonianum*. Hudson Co., Novæ Caesareæ, in paludibus coll. D. C. E. 1862—6—16."
- "*Aspidium cristatum*, Swz. v. *Clintonianum*, D. C. E. Newark, N. J. Wm. Prower — 1865."
- "*Aspidium cristatum* — Sw. — v. *Clintonianum*, D. C. E. Utica, New York. J. A. Paine, Jr., 1865. 'Low swampy woods.'"
- "*Aspidium cristatum*, Sw. v. *Clintonianum*, D. C. E. Central New York. J. A. Paine, Jr. 1865."

Of these, all but the first cited correspond to the form now commonly known as *Dryopteris Clintoniana*.

The Clinton label "a" reads as follows :

a. Ex Coll. G. W. Clinton
Aspidium cristatum
 var. major
 Please fill up & return
 Buffalo, New York.
 Height of frond 29 inches

The words "*crisatum* var. *major*" are in Eaton's writing. The "Please fill up and return" is in pencil, also the words "Height of frond."



FIGURE I. The original Clinton specimen.

The original description and comment are as follows :

“*Aspidium cristatum* var. *Clintonianum*. (In A. Gray Manual of Botany Edition 5. 665. 1867.)

Fronde in every way larger ($2\frac{1}{2}^{\circ}$ – 4° long); pinnae oblong-lanceolate, *broadest at the base* (4'–6' long, 1'–2' broad) deeply pinnatifid, the *divisions* (8–16 pairs) crowded or distant, *linear-oblong*, obtuse, obscurely serrate or cut-toothed, the basal ones sometimes pinnately lobed; veins pinnately forking, the lowest anterior veinlets bearing *fruit-dots near the midvein*; indusium orbicular with shallow sinus, smooth and naked. Swampy woods, New England to New Jersey, New York (G. W. Clinton, &c.), and westward. July.

Rootstock stout, creeping, chaffy (like the stipes) with large bright brown scales. A showy Fern, unlike any European form of *A. cristatum*, and often mistaken for *A. Goldianum*.”

As thus drawn, the description is apparently based both on the Clinton specimen, and on other material, presumably that cited above. The Clinton specimen probably contributed the maximum number of pinnulae as given (16)—the other material, the shape of the pinnae, “broadest at the base,” and the minimum number of pinnulae (8). As a matter of fact, the pinnae of the Clinton specimen are not broadest at the base, but are mostly of equal width toward the middle or even broader there. This character, together with the numerous pinnulae—in so-called *D. Clintoniana* rarely as many as 12–14—the numerous sori per pinnula (mostly 8–9), and the general cutting relate the original Clinton fern to *Dryopteris Goldiana* rather than to *D. cristata* or its so-called variety, Professor Eaton’s opinion to the contrary notwithstanding. Positive proof of this relationship is to be found in the cell-structure of the indusia which are unmistakably of the *Goldiana* type, and not to be confused with those of *D. Clintoniana* so-called. That the specimen represents straight *D. Goldiana* is unlikely. It seems more reasonable to consider it as probably a cross, perhaps with the *D. Clintoniana* of recent authors. An illustration of a leaf collected by Mr. Macy Carhart near Lodi, N. J., and identified as this cross, is included for comparison (Figure 2). Further evidence that the Clinton speci-



FIGURE 2. *Dryopteris Clintoniana* x *Goldiana* Dowell.

men may be a hybrid is to be found in its sporangia which are nearly all abortive. The few full-sized ones seem to have developed only sterile-looking spores.

But whatever the exact identity of the original Clinton fern, it is clearly different from the *D. Clintoniana* of common usage and the question as to which form may properly bear this name remains for consideration. Under ordinary circumstances, the citation of Judge Clinton's collection together with the fact that the plant was named in his honor would be sufficient to establish as type the single Clinton specimen seen by Eaton and now at Springfield. In the present case, however, the description agrees less with this specimen than with others in the Eaton herbarium. Indeed the origin of the single character which appears to have been derived exclusively from the Buffalo plant—that of the maximum number of pinnulae per pinna—is open to question. In unconformably divided leaves such as are those in question, unless a minimum dimension is agreed upon beforehand, two observers are likely to arrive at very different estimates as to the number of any given part. Furthermore it is not at all impossible that Eaton may merely have "filled in" the label as requested and returned the plant to Judge Clinton, afterwards basing his description on material present in his own herbarium. The facts then seem to justify the somewhat paradoxical treatment of rejecting the Clinton specimen as type of *Dryopteris Clintoniana*, and fixing if possible upon one of Eaton's early specimens of the fern we know now as this species.

The rules suggested by the Nomenclature Commission of the Botanical Club of the American Association for the Advancement of Science in the "Propositions relating to the amendment and completion" of the Vienna rules and recently published in the Bulletin of the Torrey Club (36: 55-74. 1909) seem applicable at least in part, to the present case. Under Proposition 8, No. 3°, is the following statement: "In default of an original specimen, that represented by the identifiable figure or (in default of a figure) description first cited or subsequently published, serves as type."

In Eaton's Ferns of North America, Volume 2, plate 66,

figures 6, 7, 8, and 9 show respectively a pinna, a pinnule, an indusium, and a spore of "*Aspidium cristatum* var. *Clintonianum*." The pinna unmistakably belongs to a leaf of the sort ordinarily identified as *D. Clintoniana*, but is not like those of Judge Clinton's collection. The leaf illustrated is presumably in the Eaton herbarium to-day, and if it can be determined by the figure, should serve as the type. Rules 1° and 2° are inapplicable owing to the exclusion of the Clinton specimen. For purposes of completeness, an amended description of *Dryopteris Clintoniana* is here included.

✓ DRYOPTERIS CLINTONIANA (D. C. Eaton) Dowell

Aspidium cristatum var. *Clintonianum* D. C. Eaton in A. Gray Manual of Botany, Edition 5: 665. 1867.

Rootstock horizontal, the crown unsymmetrical, with low spreading juvenile sterile leaves, and taller more erect fertile ones, up to 4 feet in length: lamina broadly oblong, acuminate, the pinnae mostly acuminate or long-acute, usually broadest at the base, deeply divided, the divisions oblong, mostly slightly falcate, 8-12, rarely as many as 14 per pinnula (counting those with more than 2 sori, or on sterile or sparsely fertile fronds, those 8 mm. or more long): sori mostly 6-8 per pinnula, the indusia glabrous, with heavy radial ribs, the cells mostly narrow, the walls all very sinuate.

Type in question.

The problems in connection with *Dryopteris Clintoniana* are not ended with the fixing of a type. It appears to be in some respects an extremely variable plant, and a study of a wide range of material with a view to determine the limits of this variation is desirable. Its behavior in hybridization also offers an interesting field for study and affords moreover evidence as to its distinctiveness in addition to that derived from its own characters, for the hybrids, when compared with the corresponding crosses of *D. cristata*, maintain for the most part the well-marked differences of the parent forms. But perhaps the best evidence of the distinctiveness is found in the occasional finds of sterile or partially sterile intermediates between the two species, the only intermediates to be found as far as my experience goes. Description

of this hybrid is best delayed until *D. Clintoniana* shall have been more carefully studied. Credit for its recognition belongs to Dr. Philip Dowell.

In conclusion, I wish to thank Professor A. W. Evans, the Springfield Botanical Society, Miss Margaret Slosson, and Dr. Philip Dowell for favors received in connection with work on this paper.

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AMBER IN THE LARAMIE CRETACEOUS*

BY T. D. A. COCKERELL

Recently, with the help of my wife and a number of students, I have been investigating the flora of the Laramie Cretaceous at Marshall, Boulder County, Colorado. This locality produces much of the coal used in Boulder, and has long been known to palaeobotanists, having furnished important materials to Lesquereux many years ago. Perhaps the most interesting thing found is a small piece of amber,† embedded in the solid rock. It measures about eight millimeters by five and a half, and is translucent orange-brown, darker than Baltic amber. It is practically insoluble in alcohol; a small fragment left in it over night was scarcely if at all diminished. In ether it eventually becomes opaque and friable. In TORREYA, January, 1907, Mr. E. W. Berry gave a very interesting account of the occurrence of amber in the Cretaceous beds of the Atlantic coast region; it now appears that this substance is widely distributed in our Upper Cretaceous, and it may be possible that somewhere it will be discovered in large quantities. The discovery of large pieces of Cretaceous amber would be an event of the highest importance, as there seems to be no reason why they should not contain plant remains and insects. Cretaceous insects are exceedingly desirable at the present time, to throw light on the evolution of

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† In using the term amber for the fossil resin of the Laramie strata, it is only intended to imply that it is a transparent fossil resin, with all the appearances of the substance known as amber. It is of course not the product of the same tree as the Baltic (typical) amber; indeed, judging from the accompanying foliage, it is very probably not even the product of a conifer.